

SEVERE LOCAL STORMS, AUGUST 1941—Continued

Place	Date	Time	Width of path, yards	Loss of life	Value of property destroyed	Character of storm	Remarks
Burns, Kans., vicinity of.... Berne, Ind.....	23-24 25	Midnight... 4:45 p. m.....	880	-----	5,500	High wind..... Hail.....	Property damage, \$2,000; loss in crops, \$2,500; path 10 miles long. Hailstones described as being as large as apples and that 2 hours after they had fallen, small pieces of ice could be found on the ground. Damage to rural property; path 3 miles long.
Lincolnton, Kans., about 1 mile northeast. Marion and Morris Counties, Kans. Marion and Morris Counties, Kans.	25	5:15-5:30 p. m.....	-----	0	70,000 damage from 3 tornadoes.	Tornado.....	Originated about a mile west of Lincolnton where 3 business houses and many other buildings were damaged; path 8 miles long.
		5:15-5:30 p. m.....	100	0		do.....	Started 4 miles south Ramona, passed south of Lost Springs and Burdick and ended 8 miles southeast of Wilsey. School building demolished and rural property damaged; path 25 miles long.
		5:15-5:55 p. m.....	33	0		do.....	These 3 tornadoes seem to have appeared at about the same time and only the aggregate damage is attainable. 6 persons were injured, 1 seriously. Damage to trees and gardens.
Gothenburg, Nebr., and vicinity.	25	6 p. m.....	1	-----	5,000	Hail, wind and rain.	Property damaged.
Junction City, Kans., vicinity of.	25	11 p. m.....	-----	-----	2,000	Wind and hail....	Storm began at Kemblesville and moved eastward into Delaware. 15 homes were damaged, 10 barns blown down, and 25 others unroofed. Trees uprooted and twisted off, tops torn out, corn uprooted and damaged by hail and telephones disrupted.
Kemblesville, Pa., vicinity of.	25	P. m.....	300	0	75,000	Tornado and hail.	Loss in crops; path 30 miles long.
Westmoreland, Kans., vicinity of.	26	7 p. m.....	125	-----	7,000	Heavy hail.....	Much glass broken; automobile tops punctured and airplanes damaged.
Wichita, Kans., southern portion.	26	7:09-7:20 p. m.....	-----	-----	50,000	do.....	Loss in wheat, barley, oats and gardens; path 6 miles long.
Cottonwood, Idaho.....	26	do.....	12	-----	15,000	Hail.....	Property damaged.
Norfolk, Va.....	26	do.....	-----	-----	4,000	Thunderstorm....	Much crop loss; path 60 miles long.
Powder River and Carter Counties, Mont.	28	do.....	14	-----	-----	Hail.....	Loss in growing crops, \$57,000; property damage, \$3,000; path 25 miles long.
Grant, Douglas, Big Stone, southern Morrison and northern Benton Counties, Minn.	29	9:15 a. m.....	115	-----	60,000	do.....	Property damaged; loss in crops; 1 person injured; path 75 miles long.
Wilkin, Grant, Ottertail, Douglas, Kanabec Counties, Minn.	29	9:15 a. m.....	115	-----	76,000	Thundersqualls...	Trees blown down blocking highways; utility service disrupted, and property damaged. The highest wind velocity recorded was 44 miles from the northwest at 2:10 p. m., at which time 2 large smokestacks and a large pulpwood conveyor were blown over. Fruit trees damaged and much corn leveled.
Sawyer, Pine, and Price Counties, Wis., and vicinity.	29	P. m.....	-----	-----	4,800	Thundersquall and heavy rain.	Loss in growing crops, \$5,000; property damage, \$500.
Beardsley, Minn., vicinity of.	30	2:15 p. m.....	-----	-----	5,500	Hail.....	Barn burned.
Hartwick, Iowa, vicinity of.	31	4:30-5:30 p. m.....	-----	-----	4,000	Electrical.....	

¹ Miles instead of yards.

SOLAR RADIATION AND SUNSPOT DATA FOR AUGUST 1941

SOLAR RADIATION OBSERVATIONS

By HELEN CULLINANE

Measurements of solar radiant energy received at the surface of the earth are made at 9 stations maintained by the Weather Bureau and at 12 cooperating stations maintained by other institutions. The intensity of the total radiation from sun and sky on a horizontal surface

is continuously recorded (from sunrise to sunset) at all these stations by self-registering instruments; pyrheliometric measurements of the intensity of direct solar radiation at normal incidence are made at frequent intervals on clear days at three Weather Bureau stations (Madison, Wis.; Lincoln, Nebr.; and Albuquerque, N. Mex.) and at the Blue Hill Observatory at Harvard University. Occasional observations of sky polarization are taken at the

Weather Bureau station at Madison and at Blue Hill Observatory.

The geographic coordinates of the stations, descriptions of the instrumental equipment, station exposures, and methods of observation, together with summaries of the data obtained, up to the end of 1939, are given in the MONTHLY WEATHER REVIEW for December 1937 and April 1941.

Table 1 contains the measurements of the intensity of direct solar radiation at normal incidence, with means and their departures from normal (means based on less than 3 values are in parentheses). At Lincoln, Madison, Albuquerque, and Blue Hill the observations are obtained with a recording thermopile, checked by observations with a Smithsonian silver-disk pyrheliometer at Blue Hill. The table also gives vapor pressures at 7:30 a. m. and at 1:30 p. m. (75th meridian time).

Table 2 contains the daily total amounts of radiation received on a horizontal surface from both sun and sky for all stations except Fairbanks, Alaska; and also the weekly means, their departures from normal and the accumulated departures since the beginning of the year. The values at most of the stations are obtained from the Eppley pyrheliometer recording either on a microammeter or a potentiometer. If the daily figures for total solar and sky radiation at Fairbanks should be desired, they may be obtained approximately 2 months after the date of the observation by writing to the Solar Radiation Investigations Supervisory Station, Blue Hill Observatory, Milton, Mass.

Normal incidence radiation was below normal at Lincoln and Madison for August.

Total solar and sky radiation during August was above normal at all stations with the exception of Fairbanks, La Jolla, and Friday Harbor.

Polarization measurements made on 10 days at Madison give a mean of 56 percent with a maximum of 68 percent on the 27th. Both of these values are close to the August normals.

LATE DATA

Total solar and sky radiation at Chicago

July 2.....	584	July 9.....	611	July 16.....	628	July 23.....	274
3.....	427	10.....	386	17.....	587	24.....	528
4.....	779	11.....	613	18.....	536	25.....	590
5.....	735	12.....	568	19.....	708	26.....	523
6.....	650	13.....	732	20.....	677	27.....	602
7.....	478	14.....	694	21.....	711	28.....	600
8.....	594	15.....	580	22.....	421	29.....	621
Mean.....	604	Mean.....	598	Mean.....	610	Mean.....	534
Departure.....	+98	Departure.....	+103	Departure.....	+116	Departure.....	+44

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TABLE 1.—Solar radiation intensities during August 1941
[Gram-calories per minute per square centimeter of normal surface]

ALBUQUERQUE, N. MEX.

Date	Sun's zenith distance										Local mean solar time	
	7:30 a. m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°		1:30 p. m.
	75th mer. time	Air mass										
		A. M.					P. M.					
		e.	5.0	4.0	3.0	2.0	1.0	2.0	3.0	4.0		5.0	e.
	mm.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	mm.	
Aug. 1	8.82	0.87	0.97	1.09	1.21	cal.	cal.	cal.	cal.	cal.	10.59	
Aug. 3	8.82	.85	.92	1.07	1.19	1.42					10.20	
Aug. 4	10.20	.82	.92	1.05	1.21	1.40					11.38	
Aug. 5	10.20						1.18				9.47	
Aug. 10	12.24				1.10						11.38	
Aug. 11	10.98		.91	1.03	1.17						11.38	
Aug. 12	10.59				1.17						10.59	
Aug. 14	11.81	.85	.96	1.07	1.19	1.40		0.96	.88		11.81	
Aug. 16	10.59	.74	.84	.97	1.10	1.43	1.20				10.98	
Aug. 17	10.98	.80	.93	1.04	1.18						11.81	
Aug. 18	10.98	.85			1.22	1.43	1.23	1.10	.99	0.93	10.21	
Aug. 19	7.59	.85	.95	1.07	1.17	1.41	1.23		1.01	.92	9.14	
Aug. 20	10.98	.76	.86	1.00	1.17	1.36					10.59	
Aug. 22	9.84	.76	.86	1.00	1.17	1.42		1.04	.93	.82	10.59	
Aug. 23	10.20	.86	.93	1.05	1.20	1.44					7.87	
Aug. 24	9.14				1.18	1.43	1.26		1.02		9.84	
Aug. 25	7.30	.86	.99	1.13	1.30	1.53	1.23	1.07	.93	.85	6.76	
Aug. 26	6.28	.90	1.00	1.12	1.27	1.45	1.30	1.13	1.02	.92	6.50	
Aug. 27	6.02	.90	1.00	1.12	1.26	1.42	1.27	1.12	.98	.86	7.30	
Aug. 28	9.84	.87	.95	1.09	1.21		1.21				10.98	
Aug. 31	12.68				1.19	1.40	1.20	.97	.88	.78	12.68	
Means		.84	.93	1.06	1.19	1.42	1.23	1.06	.96	.87		

LINCOLN, NEBR.

Aug. 4.....	16.79	.....	.....	.....	.....	0.90	0.69	0.56	0.46	16.21
Aug. 5.....	14.60	.....	.....	.....	.....	.90	.72	.....	.....	19.23
Aug. 13.....	11.38	.....	.....	.....	.....	.....	.77	.62	.47	13.13
Aug. 20.....	13.61	.....	.....	1.12	.....	.....	.....	.....	.....	15.65
Aug. 27.....	8.81	.....	.....	.....	.....	.....	.86	.71	.60	8.81
Aug. 31.....	13.61	.....	.....	.....	.....	1.14	.97	.85	.73	11.38
Means.....	.....	.....	.....	(1.12)	.....	.98	.80	.68	.56	.....
Departures.....	.....	.....	.....	+.03	.....	-.09	-.08	-.07	-.08	.....

MADISON, WIS.

Aug. 2.....	12.68	0.52	0.61	0.74	0.95	1.22	.....	.....	.....	14.10
Aug. 5.....	14.60	.....	.40	.50	.79	1.16	.....	.....	.....	14.60
Aug. 7.....	12.68	.34	.44	.59	.77	1.16	.....	.....	.....	13.61
Aug. 12.....	12.68	.69	.77	.96	1.15	1.36	.....	.....	.....	10.21
Aug. 14.....	9.47	.68	.76	.87	.95	.....	.....	.....	.....	10.59
Aug. 19.....	10.21	.....	.88	1.01	1.16	1.35	.....	.....	.....	9.83
Aug. 22.....	13.61	.....	.....	.....	1.14	1.31	.....	.....	.....	10.59
Aug. 27.....	7.29	.80	.92	1.08	1.21	1.44	.....	.....	.....	6.76
Aug. 28.....	7.87	.....	.....	.....	.99	1.24	.....	.....	.....	9.47
Aug. 29.....	10.21	.44	.57	.69	.90	1.14	.....	.....	.....	15.65
Aug. 30.....	17.37	.61	.70	.....	.....	.....	.....	.....	.....	19.89
Means.....	.....	.58	.67	.80	1.00	1.26	.....	.....	.....	.....
Departures.....	.....	-.11	-.12	-.13	-.09	-.06	.....	.....	.....	.....

¹ Extrapolated.

TABLE 2.—Daily totals and weekly means of solar radiation (direct+diffuse) on a horizontal surface

[Gram-calories per square centimeter]

Date	Washing- ton	Madison	Lincoln	New York	Chicago	Fresno	Albu- querque	Fair- banks	Newport	Cam- bridge	Friday Harbor	River- side	New Orleans	La Jolla	State College
	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.
July 30.....	227	597	291	104	547	685	703	-----	116	109	668	659	510	575	348
July 31.....	443	570	609	224	547	708	610	-----	248	128	686	643	685	656	370
Aug. 1.....	643	593	557	375	667	700	720	-----	514	398	477	637	596	610	656
Aug. 2.....	-----	629	603	528	652	692	571	-----	518	534	333	563	444	380	706
Aug. 3.....	-----	528	639	640	595	671	578	-----	598	549	281	569	259	563	692
Aug. 4.....	612	323	605	615	457	683	-----	-----	516	543	519	576	513	526	55
Aug. 5.....	462	592	401	485	567	649	-----	-----	589	507	504	440	598	508	515
Mean.....	477	547	538	424	576	684	636	319	443	396	508	584	515	574	549
Departure.....	-10	+68	+23	-12	+140	+26	+21	-29	-103	-60	-56	+33	+112	+2	-----
Aug. 6.....	572	617	625	641	679	389	-----	-----	569	574	658	586	591	393	686
Aug. 7.....	616	589	573	592	570	656	-----	-----	627	636	647	464	460	573	708
Aug. 8.....	586	555	573	620	494	655	-----	-----	625	603	617	589	635	467	656
Aug. 9.....	552	600	441	509	654	673	-----	-----	660	479	621	498	589	508	415
Aug. 10.....	437	441	604	663	445	495	576	-----	553	651	614	62	587	234	708
Aug. 11.....	555	482	408	562	581	657	631	-----	632	616	336	535	525	301	441
Aug. 12.....	419	657	535	551	558	612	394	-----	454	475	505	622	482	636	583
Mean.....	534	562	537	591	569	591	-----	304	589	576	571	479	553	444	600
Departure.....	+82	+99	+46	+197	+141	-37	-----	-14	+72	+81	+16	-34	+145	-78	-----
Aug. 13.....	665	593	650	686	686	650	585	-----	636	649	572	606	494	593	714
Aug. 14.....	613	309	604	497	415	645	652	-----	477	534	598	467	646	457	612
Aug. 15.....	279	499	619	250	349	549	440	-----	382	292	514	146	684	234	120
Aug. 16.....	465	516	246	500	452	330	626	-----	274	221	585	633	582	-----	504
Aug. 17.....	581	288	356	655	266	624	454	-----	670	651	606	611	384	-----	625
Aug. 18.....	338	367	455	529	204	606	663	-----	659	616	602	943	478	-----	547
Aug. 19.....	222	587	619	127	619	635	666	-----	69	59	575	637	630	544	111
Mean.....	452	451	507	464	427	562	579	400	453	432	580	535	557	457	462
Departure.....	+13	+6	+24	+88	+11	-49	-2	+54	-22	-49	+34	+20	+165	-31	-----
Aug. 20.....	523	396	589	505	449	654	-----	-----	504	581	547	640	408	636	664
Aug. 21.....	581	338	561	527	410	649	599	-----	631	544	353	626	574	625	650
Aug. 22.....	333	574	579	482	411	637	628	-----	567	509	272	486	576	557	331
Aug. 23.....	431	571	87	313	619	649	446	-----	435	452	505	558	499	570	570
Aug. 24.....	334	361	507	551	269	612	651	-----	598	588	122	476	441	475	570
Aug. 25.....	294	407	332	86	362	624	-----	-----	177	222	247	296	405	430	281
Aug. 26.....	437	334	560	450	320	633	640	-----	534	497	-----	266	458	380	422
Mean.....	419	426	459	416	406	637	593	304	492	485	341	478	480	524	498
Departure.....	-1	-16	-20	+76	-20	+48	+6	-15	+40	+19	-127	-15	+84	-6	-----
Aug. 27.....	581	588	547	591	579	624	-----	-----	573	472	-----	430	461	478	610
Aug. 28.....	577	524	425	626	595	585	616	-----	625	622	440	363	572	419	682
Aug. 29.....	516	526	513	512	543	605	336	-----	590	561	515	542	418	544	601
Aug. 30.....	500	309	505	512	445	609	411	-----	512	438	234	611	488	620	498
Aug. 31.....	531	368	512	408	486	600	623	-----	377	136	151	548	327	504	500
Sept. 1.....	481	573	559	404	617	611	506	-----	446	460	186	609	222	614	492
Sept. 2.....	534	215	368	540	372	590	544	-----	557	555	279	585	284	509	614
Mean.....	531	443	490	513	520	604	506	370	526	464	301	527	396	540	571
Departure.....	+109	+33	+53	+159	+159	+36	-67	+90	+106	+25	-110	+51	-12	+48	-----

ACCUMULATED DEPARTURES ON SEPTEMBER 2, 1941

	+3,157	+3,353	-5,432	+14,749	-----	-1,960	-----	-2,590	-1,078	+49	+2,233	-1,135	+10,570	-3,843	-----
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